THE MAGAZINE OF METAL COMPONENT DESIGN AND PRODUCTION

NOVEMBER 1979

Precision Metal

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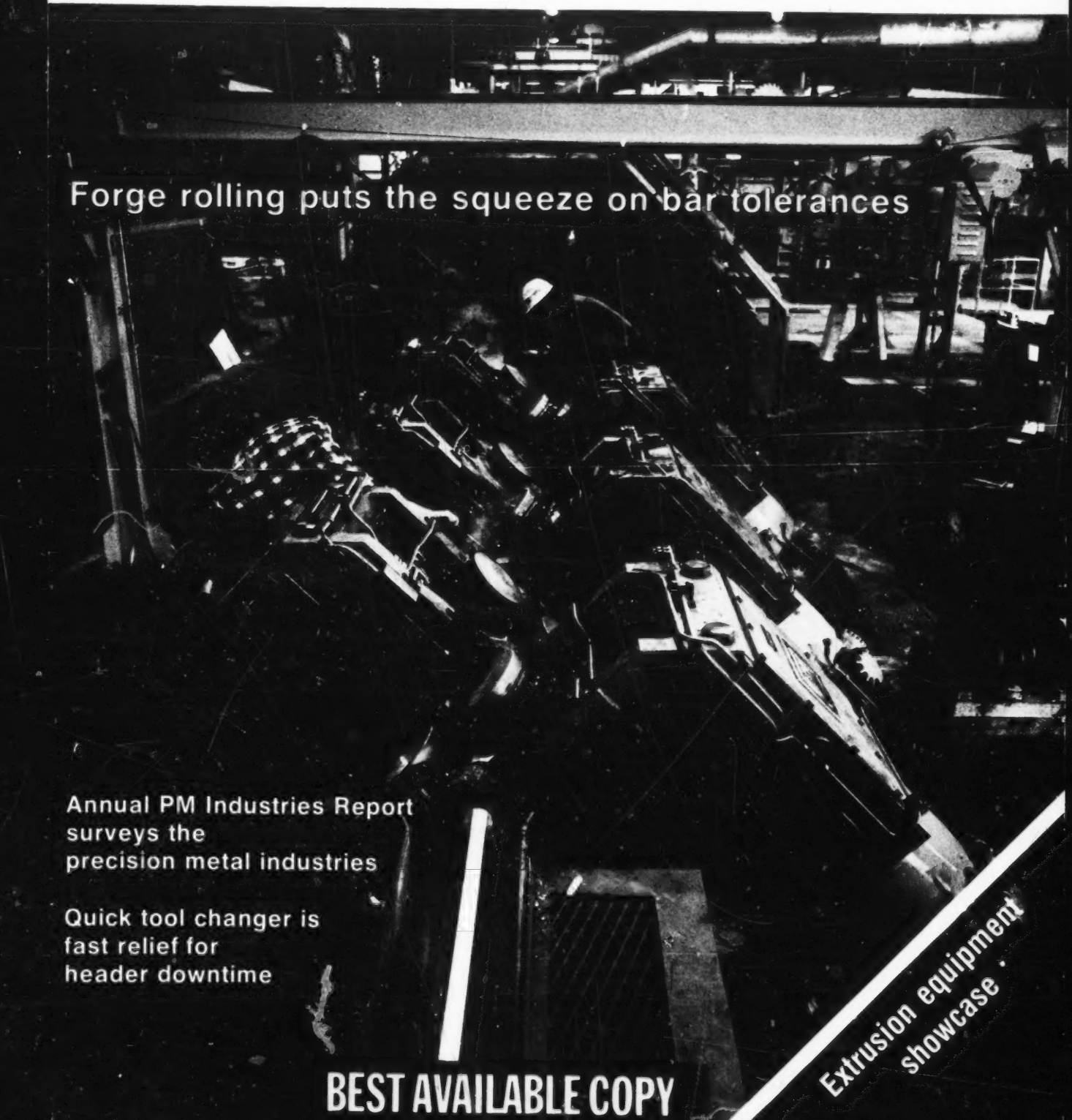

Forge rolling puts the squeeze on bar tolerances

Annual PM Industries Report surveys the precision metal industries

Quick tool changer is fast relief for header downtime

Extrusion equipment showcase

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NOVEMBER 1979
VOLUME 37
NO. 11

Precision Metal

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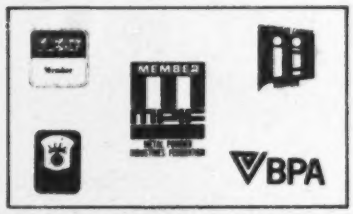


ABOUT THE COVER
Bar shown emerging from precision forge rolling mill is a close-tolerance product that can improve the economy of certain types of forgings. Photo courtesy of Roblin Steel Co.

Precision Metal
NOVEMBER 1979 VOLUME 37 NO. 11

1979 annual PM industries report

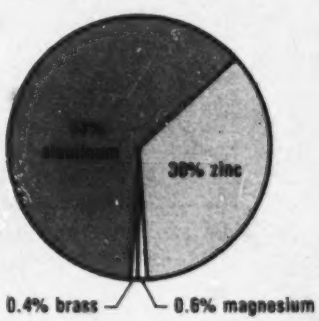
The 1979 precision metal industries report is our annual survey of six metalworking industries: die casting, extrusion, forging, investment casting, powder metallurgy and roll forming. Individual reports investigate industry production capacity, production, materials consumption and plans to buy new equipment. This year, we asked if respondents expected an increase or decrease in production next year, and the tabulated response indicates these industries expect an overall increase in production in 1980. Data for this report is provided from our own survey plus that provided by industry associations.

THE DIE CASTING INDUSTRY

CAPTIVE OR CUSTOM? ACCORDING TO OUR SURVEY, THE DIE CASTING INDUSTRY IN 1979 IS . . .

The average die casting plant employs 76.9 people. It uses 238,500 lbs. of die steel, 3,050 gal. of die and plunger lube (73.3% of which is water base) and 3,750 gal. of hydraulic fluid, 93% of which is fire-resistant. 75% of plants surveyed purchase dies from outside sources.

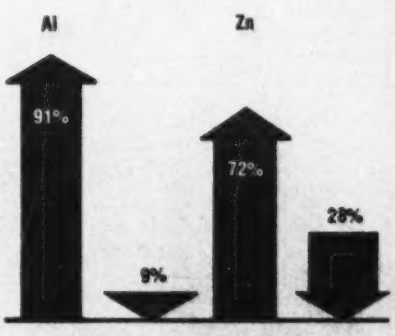
BY WEIGHT, PRODUCTION OF DIE CASTINGS FOR 1978 WAS . . .



TONS SHIPPED

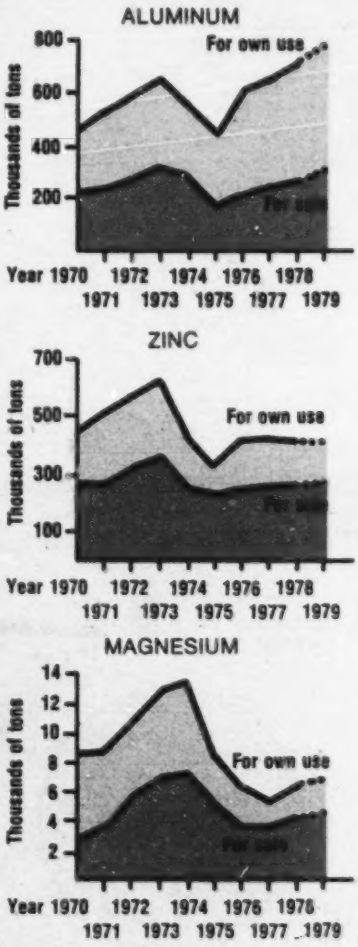
METAL	CUSTOM 78	CUSTOM 79 (EST)	CAPTIVE 78	CAPTIVE 79 (EST)	% CHANGE CUSTOM	% CHANGE CAPTIVE
ALUMINUM	270,000	305,000	455,000	465,000	+13%	+2.2%
ZINC	266,000	275,000	150,000	135,000	+3.4%	−10%
MAGNESIUM	4,250	4,625	2,250	2,375	+8.8%	+5.6%
BRASS	2,250	2,150	2,000	1,850	−4.4%	−7.5%

Die casting production for 1978 and estimated for 1979 shows the effect of the auto industry's weight reduction programs on captive zinc and custom aluminum and magnesium. Custom zinc, however, should be up nearly 3-1/2% for 1979, helped by the thin wall program and advanced casting technology. American Die Casting Institute data.



Die casters forecast 1980. Numbers inside arrows indicate percentages of die casters surveyed that expect an increase or decrease in tonnage for 1980.

10-YEAR TRENDS IN DIE CASTING SHIPMENTS

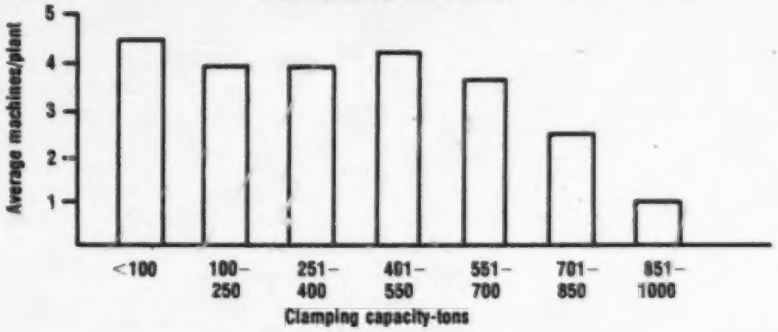


10-year trends in die casting shipments are derived from data on annual metal requirements. Shipments for 1979 are estimated, as indicated by the dashed lines. All three metals show the same general trends for total tonnage shipped. Aluminum, which reached a minimum of 440,000 tons in 1975, has been steadily increasing since then, with most of the gains seen in the custom segment. The custom die casting industry helped zinc remain stable at the low 400,000-ton level over the past four years while captive production declined. Magnesium, growing significantly in the custom segment, continues its increasing trend for estimated 1979 production.

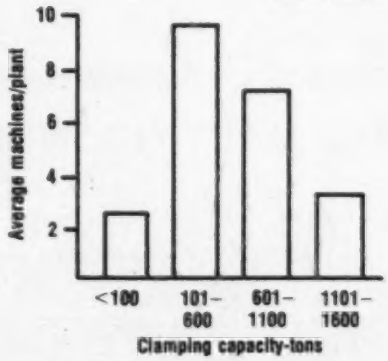
A.D.C.I data

DIE CASTING PRODUCTION EQUIPMENT SURVEY

DISTRIBUTION OF HOT CHAMBER DIE CASTING MACHINES INSTALLED PER PLANT



DISTRIBUTION OF COLD CHAMBER DIE CASTING MACHINES INSTALLED PER PLANT



Based on projected data, there are currently 5400 hot chamber and 11,500 cold chamber die casting machines installed in the industry. Plans to buy indicate an additional 280 hot chamber machines (a 5.2% increase) and 382 cold chamber machines (a 3.3% increase) will be added in 1980, pointing toward expected healthy business for both zinc and aluminum.

METAL MELTING/HOLDING EQUIPMENT

Furnace type	Installed per plant	Projected ind. total	Estimated total additions '80	% increase
BREAKDOWN				
FUEL FIRED	3.1	3720	218	+5.9%
ELECTRIC	0.9	1080	66	+6.1%
HOLDING				
FUEL FIRED	7.2	8640	524	+6.1%
ELECTRIC	3.8	4560	273	+6.0%
		18,000 Total capacity	1081 Total additions	

DIE CASTING METAL HANDLING EQUIPMENT SURVEY

Equipment type	Installed per plant	Projected ind. total	Estimated total additions-'80
CASTING CONVEYORS	1.8	2160	569
SCRAP CONVEYORS	1.9	2280	850
MANIPULATORS	2.4	2280	600
PROGRAMMABLE ROBOTS	0.3	360	130
AUTO LADLES	3.6	4320	447

DIE CASTING SECONDARY EQUIPMENT SURVEY

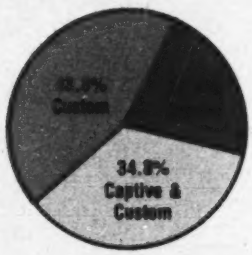
EQUIPMENT TYPE	INSTALLED PER PLANT	PROJECTED IND. TOTAL	ESTIMATED TOTAL ADDITIONS-'80
TRIM PRESSES			
MECHANICAL	6.7	8040	376
HYDRAULIC	7.9	9480	258
FINISHING EQUIPMENT			
VIBR/BARREL	2.7	3240	577
POLISHING	6.9	8160	217
SPRAY PAINT	2.4	2880	349

DIE CASTING EXPENDABLE SUPPLIES USAGE

ITEM	QUAN. USED PER PLANT	PROJECTED TOTAL USED
GOOSENECKS	4.1	4919
PLUNGER TIPS	42	50,933
PLUNGER RINGS	94	112,472
F.R. HYDR. FLUID	3488	4,185,000 gal.
DIE/PLUNGER LUBE	3050	3,666,000 gal.

THE EXTRUSION INDUSTRY

CAPTIVE OR CUSTOM? ACCORDING TO OUR SURVEY, THE EXTRUSION INDUSTRY FOR 1979 IS . . .



PRESS CAPACITY AND PLANS TO ADD CAPACITY ARE . . .

PRESS TONNAGE	INSTALLED PER PLANT	PROJECTED IND. TOTAL	ESTIMATED TOTAL ADDITIONS-'80
<1000	3.2	700	40
1000-1499	1.1	550	33
1500-1999	1.4	700	19
2000-2999	2.0	1000	100
3000-4000	0.8	400	30
		3350 Total capacity	222 Total additions

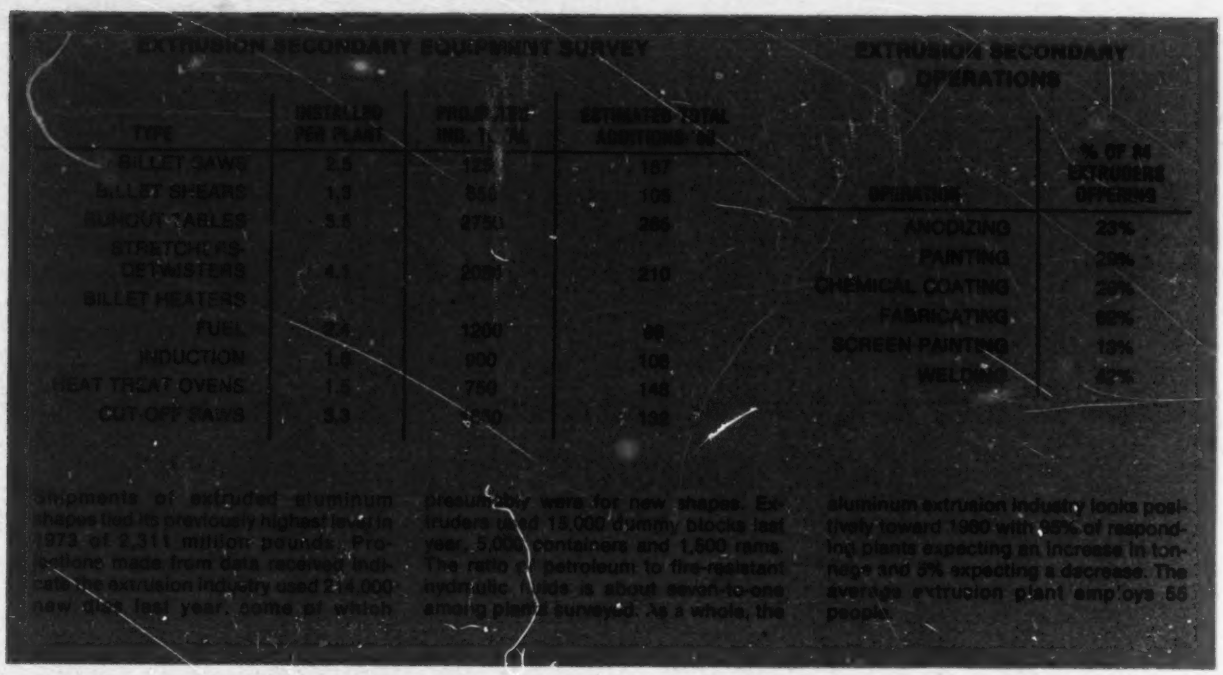
10 YEAR TRENDS IN EXTRUDED ALUMINUM SHIPMENTS

(MILLIONS OF LBS.)

	1978	1977	1976	1975	1974	1973	1972	1971	1970	1969	1968
Extruded shapes											
Building & contruction	1,230	1,163	1,019	812	1,074	1,302	1,250	1,087	910	928	867
Transportation	491	427	350	234	424	437	328	227	236	292	256
[illegible]	[illegible]										
Machinery & equipment	115	88	81	72	84	79	67	57	54	66	58
Containers & packaging	—	—	—	—	—	—	1	1	1	1	1
[illegible]											
Exports	17	9	10	14	18	17	8	8	11	8	7
EXTRUDED SHAPES TOTAL	2,111	1,913	1,691	1,313	1,874	2,111	1,884	1,594	1,413	1,533	1,433
Extruded pipe & tube											
Building & construction	29	31	33	27	42	46	47	46	45	41	35
Transportation	24	21	18	14	18	20	16	11	9	9	8
[illegible]											
Machinery & equipment	35	45	53	31	65	55	38	40	33	46	45
Containers & packaging	—		—	—	—	—	—	—	—	—	—
[illegible]											
Exports	18	20	19	14	15	10	5	7	5	3	4
EXTRUDED PIPE & TUBE TOTAL	177	185	190	137	221	229	195	187	179	199	185

ALUMINUM ASSOCIATION DATA

1979 ANNUAL PM INDUSTRIES REPORT



EXTRUSION SECONDARY EQUIPMENT SURVEY

TYPE	INSTALLED PER PLANT	PRESENTLY INSTALLED	ESTIMATED TOTAL ADDITIONS IN
BILLET SAWS	2.5	123	187
BILLET SHEARS	1.3	65	105
RUNOUT TABLES	5.6	2750	285
STRETCH PRESS			
DEMISTERS	4.1	2051	210
BILLET HEATERS			
FUEL	2.4	1200	98
INDUCTION	1.8	900	108
HEAT TREAT OVENS	1.5	750	148
CUT-OFF SAWS	5.3	270	138

EXTRUSION SECONDARY OPERATIONS

OPERATION	% OF 84 EXTRUDERS OFFERING
ANODIZING	23%
PAINTING	23%
CHEMICAL COATING	23%
FABRICATING	62%
SCREEN PAINTING	13%
WELDING	8%

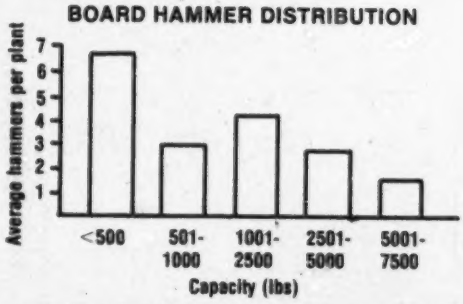
Shipments of extruded aluminum shapes tied its previously highest level in 1973 at 2,311 million pounds. Projections made from data received indicate the extrusion industry used 214,000 new dies last year, some of which presumably were for new shapes. Extruders used 15,000 dummy blocks last year, 5,000 containers and 1,600 rams. The ratio of petroleum to fire-resistant hydraulic fluids is about seven-to-one among plants surveyed. As a whole, the aluminum extrusion industry looks positively toward 1980 with 65% of respondent plants expecting an increase in tonnage and 5% expecting a decrease. The average extrusion plant employs 66 people.

THE FORGING INDUSTRY

CAPTIVE OR CUSTOM? ACCORDING TO OUR SURVEY, THE FORGING INDUSTRY IN 1979 IS . . .

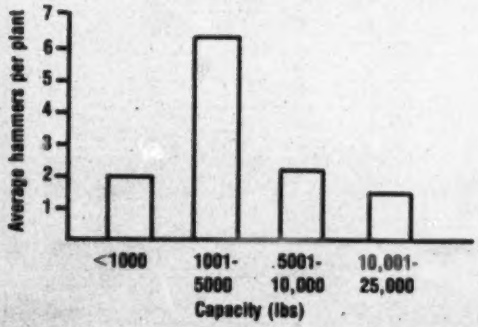
The average forge plant among those surveyed employs 89 people. A relatively high percentage (73.3%) make their own forging dies, and even more (76.1%) make their own trim dies. Estimated total consumption of expendable supplies includes 6 million gallons of die lube and 1 million gallons of F.R. hydraulic fluid. Projected data indicates the forging industry used 95 million pounds of die steel last year, with an average of 40 new dies per plant.

BOARD HAMMER DISTRIBUTION



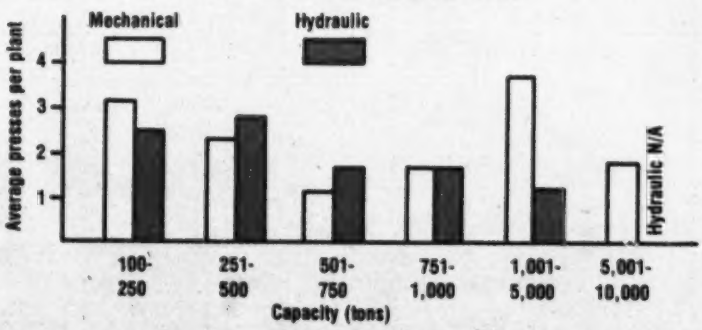
Based on projected data, there are currently 2250 board hammers installed. Plans to buy indicate an additional 160 units in 1980.

STEAM/AIR HAMMER DISTRIBUTION



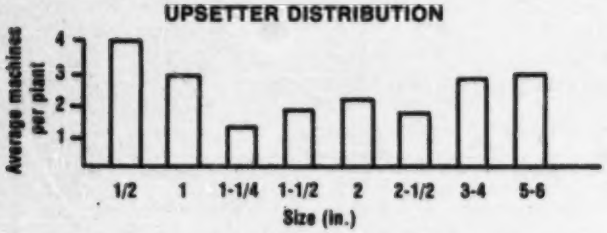
Based on projected data, there are currently 2,880 steam & air hammers installed. Plans to buy indicate an additional 155 units in 1980.

FORGING PRESS DISTRIBUTION



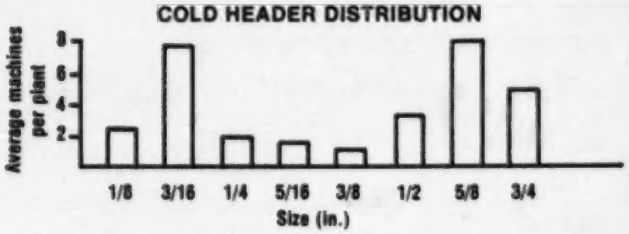
Based on projected data, there are currently 1,614 mechanical and 349 hydraulic forging presses installed. Plans to buy indicate an additional 55 hydraulic presses and 85 mechanical presses in 1980.

UPSETTER DISTRIBUTION



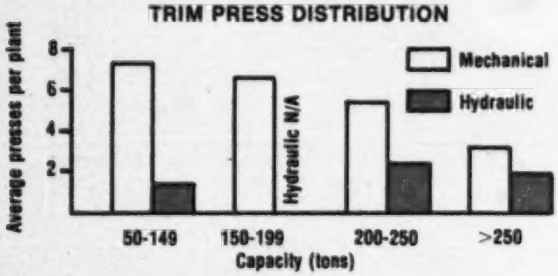
Among plants that have upsetters, there are an estimated 1,600 units currently installed, with plans to add 133 units in 1980.

COLD HEADER DISTRIBUTION



Among plants that have cold headers, there are an estimated 833 units currently installed, with plans to add 50 units in 1980.

TRIM PRESS DISTRIBUTION



Based on projected data, there are currently 5,134 mechanical and 240 hydraulic trim presses installed. Plans to buy indicate an additional 350 mechanical and 130 hydraulic trim presses in 1980.

AUXILIARY EQUIPMENT SURVEY

TYPE	AVG. INSTALLED PER PLANT	PROJ. IND. TOTAL	ESTIMATED TOT. ADDITIONS-'80
AUTO LIBRICATORS	5.7	4100	800
BILLET SAWS	3.5	2400	200
BILLET SHEARS	2.0	1600	180
BLAST CLEANING EQP.	2.0	1600	243
CONVEYOR	5.2	4000	370
EDM MACHINES	2.4	835	70
DUPLICATORS	2.7	600	85
HOBBING EQUIPMENT	1.1	57	16
MANIPULATORS	3.2	590	180
P/M PRESSES	3.0	65	10
RING ROLLERS	2.0	65	30
ROBOTS	2.1	81	38

HEATING EQUIPMENT SURVEY

FUEL FIRED BAR & BILLET HEATERS

TYPE	OIL FIRED			GAS FIRED		
	INSTALLED PER PLANT	PROJECTED IND. TOTAL	ESTIMATED ADDITIONS-'80	INSTALLED PER PLANT	PROJECTED IND. TOTAL	ESTIMATED ADDITIONS-'80
BOX	7.5	1125	45	6.0	900	112
ROTARY HEARTH	3.3	495	19	5.0	480	84
ROLLER HEARTH	0.3	45	3	0.9	135	N/A
CONTINUOUS BELT	5.3	795	82	3.1	465	56
POT	3.3	495	62	4.3	375	39
OTHER	2.5	450	24	1.4	210	17

ELECTRIC BAR & BILLET HEATERS

TYPE	INSTALLED PER PLANT	PROJECTED IND. TOTAL	ESTIMATED ADDITIONS-'80
INDUCTION	3.9	585	134
RESISTANCE	2.2	330	92

HEAT TREATING FURNACES

TYPE	INSTALLED PER PLANT	PROJECTED IND. TOTAL	ESTIMATED ADDITIONS-'80
INDUCTION	2.0	300	85
FUEL FIRED	4.8	720	189

FORGERS FORECAST 1980

Numbers inside arrows indicate percent of responding forgers that expect an increase in tonnage for 1980. An average of 78.3% of plants surveyed expect higher tonnages next year.

FORGING INDUSTRY ASSOCIATION DATA

SALES OF COMMERCIAL CLOSED DIE FORGINGS 1971-1978

TYPE OF METAL	1971		1974		1976		1977		1978	
	Dollars	Net. Wt. (tons)	Dollars	Net Wt. (tons)	Dollars	Net Wt. (tons)	Dollars	Net Wt. (tons)	Dollars	Net Wt. (tons)
FERROUS										
Carbon Steel	388,488	803.6	617,346	879.1	656,800	750.6	723,021	717.0	824,730	734.1
Common Alloy Steel	214,492	322.3	407,804	393.7	494,100	399.1	551,702	382.7	624,744	405.5
Stainless Steel	45,839	12.2	71,246	15.2	64,100	12.8	69,753	13.8	80,755	11.5
TOTAL FERROUS	648,819	1138.1	1,096,396	1288.0	1,215,000	1,162.5	1,344,476	1,113.5	1,530,031	1,150.0
NON-FERROUS		(LBS.)		(LBS.)		(LBS.)		(LBS.)		(LBS)
Aluminum	82,544	62,024	129,562	74,265	141,600	65,626	169,987	72,078	223,504	80,599
Titanium	62,854	8,817	89,327	9,851	126,200	9,256	115,065	7,919	143,971	10,220
Brass & Copper	53,142	52,976	153,666	56,676	99,400	43,276	95,867	49,649	103,798	52,052
Other Nonferrous*	5,042	4,051	5,260	2,058	7,200	1,542	7,747	1,285	8,841	1,020
TOTAL NONFERROUS	203,568	127,868	377,905	142,850	374,400	119,700	388,666	130,931	480,114	143,891
TOTAL HI-TEMP**	81,335	16,247	108,323	16,952	124,900	12,164	122,082	11,463	157,558	14,350
TOTAL $ VOLUME	933,722		1,582,624		1,714,300		1,855,224		2,167,703	

* Other includes magnesium, zinc and other.
** Those alloys whether iron, nickel or cobalt base or others suitable for use at temperatures of 1000F.

All dollar and weight values are expressed in thousands.

This data does not include (1) shipments of aircraft blades and buckets from specialized shops devoted primarily to that work; (2) products forged at temperatures below 300F; (3) forged "catalog" items; and (4) forgings shipped to affiliated plants or concerns.

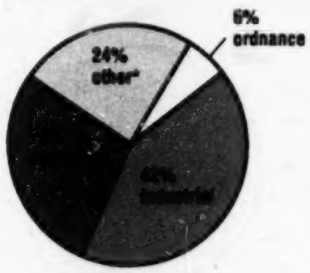
MAJOR END-USE MARKETS	1971		1974		1976		1977		1978	
	Ind. Sales $ Volume	% of Sales	Ind. Sales $ Volume	% of Sales	Ind. Sales $ Volume	% of Sales	Ind. Sales $ Volume	% of Sales	Ind. Sales $ Volume	% of Sales
1. Farm Machinery	36,780	4.0	80,714	5.1	93,601	5.5	96,472	5.2	106,218	4.9
2. Aircraft:										
Engines & Engine Parts	112,980	12.1	163,010	10.3	206,745	12.1	191,088	10.3	236,280	10.9
Aircraft, Parts & Auxiliary Eqmt.	92,065	9.9	151,932	9.6	184,973	10.8	181,812	9.8	234,112	10.8
Guided Missiles, Space Vehicles & Parts	21,662	2.3	22,157	1.4	22,457	1.3	25,602	1.4	30,348	1.4
3. Automotive:	74,885	8.0	98,123	6.2	125,315	7.3	150,273	8.1	160,410	7.4
Passenger Cars & Parts	127,360	13.6	261,133	16.5	295,545	17.2	361,719	19.5	398,857	18.4
Trucks, Buses, Trailers & Related Parts										
4. Internal Combustion Engine	14,379	1.4	22,157	1.4	25,029	1.5	25,787	1.4	28,180	1.3
5. Metalworking & Special Ind. (not mtlwrkg) Machinery	13,259	1.6	47,479	3.0	40,457	2.3	48,236	2.6	52,025	2.4
6. Mech. Power Transmission Eqmt. (incl. Bearings)	13,166	1.4	25,332	1.6	20,229	1.2	24,118	1.3	43,354	2.0
7. Nuclear	15,313	1.6	26,905	1.7	—	—	—	—	—	—
8. Fabricated Plate Work & Special Ind. Eqmt. not classified	—	—	—	—	17,657	1.0	14,842	0.8	21,677	1.0
9. Off-Highway Eqmt.	131,655	14.1	223,150	14.1	239,831	14.0	254,166	13.7	299,143	13.8
10. Ordnance (except missiles)	56,677	6.1	61,722	3.9	77,658	4.5	63,078	3.4	58,528	2.7
11. Oil Field Machinery & Eqmt.	16,714	1.8	39,566	2.5	42,686	2.5	57,512	3.1	62,836	2.9
12. Plumbing Fixtures, Valves & Fittings	32,587	3.5	94,957	6.0	78,001	4.6	90,906	4.9	95,379	4.4
13. Pumps & Compressors	15,126	1.6	11,078	0.7	8,742	0.5	11,131	0.6	13,006	0.6
14. Railroad Eqmt.	26,238	2.8	68,053	4.3	52,972	3.1	68,643	3.7	97,547	4.5
15. Refrigeration, Air Conditioning and Heating Eqmt.	9,337	1.0	23,739	1.5	21,600	1.2	15,398	0.8	15,174	0.7
16. Steam Engines & Turbines	15,406	1.7	31,652	2.0	28,972	1.7	35,249	1.9	41,186	1.9
17. Other	108,125	11.6	129,775	8.2	131,830	7.7	139,142	7.5	173,416	8.0
TOTALS	933,734	100.0	1,582,624	100.0	1,714,300	100.0	1,855,224	100.0	2,167,703	100.0

THE INVESTMENT CASTING INDUSTRY

CUSTOM OR CAPTIVE? ACCORDING TO OUR SURVEY, THE INVESTMENT CASTING INDUSTRY IN 1979 IS . . .

According to plants that responded to our survey, the average investment casting plant employs 73 people. The industry offers a very wide range of casting weights, ranging from 0.5 grams to 650 lbs. in ferrous, non-ferrous and superalloys.

END USE MARKETS FOR INVESTMENT CASTINGS



*Other includes automotive, electronics and medical

1978 CASTING PRODUCTION

METAL	PROJECTED 1978 SHIPMENTS (TONS)	PROJECTED $ VALUE (× 1000)
ALUMINUM	3,487	184,507
COPPER	1,359	27,394
TITANIUM	512	3,599
LOW-CARBON STEEL	1,518	17,247
HIGH-CARBON STEEL	1,528	994
LOW-ALLOY STEEL	1,649	10,330
HIGH-ALLOY STEEL	1,505	11,878
STAINLESS STEEL	624,023	291,862
SUPER ALLOYS	606,303	490,667
HI-TEMP ALLOYS	600,115	247,586
	Total	1,286,024

1978 EXPENDABLE SUPPLIED CONSUMPTION

TYPE	AVERAGE USED PER PLANT	PROJECTED IND. USAGE
SAND	73,667 lbs.	7,359,333 lbs.
SHOT	8,335 lbs.	695,133 lbs.
GRIT	8,958 lbs.	970,151 lbs.
GLASS BEADS	3,695 lbs.	400,169 lbs.
CRUCIBLES	6,844	1,710,316
CUT-OFF WHEELS	4,411	955,423
GRINDING WHEELS	21,230	2,655,873
INVESTMENT MATERIALS	157,290 lbs.	36,117,486 lbs.
PATTERN WAXES	44,249 lbs.	9,956,025 lbs.
PRECOAT MATERIALS	114,527 lbs.	10,503,579 lbs.
PREFORMED CORES	35,000	1,753,500

1978 INVESTMENT CASTING PRODUCTION EQUIPMENT SURVEY

TYPE	INSTALLED PER PLANT	PROJECTED IND. TOTAL	ESTIMATED TOTAL ADDITIONS-'80
AUTOCLAVES	1.4	278	12
BLAST CLNG. EQUIPMENT	3.9	1,031	40
BURNOUT FURNACES	3.1	883	52
FLUIDIZED BEDS	3.4	692	44
HEAT TREAT FURNACES	2.9	412	35
MELTING FURNACES	3.1	883	42
MICROWAVE DEWAXERS	0.5	15	4
PLASTIC MOLDING MACH.	2.8	185	28
ROBOTS	2.0	92	14
STUCCO UNITS	2.4	342	37
VACUUM CSTG. EQUIPMENT	3.1	353	30
WAX EXTRUDERS	2.4	171	15
WAX INJECTORS	5.5	1,454	85

INVESTMENT CASTERS FORECAST 1980

Investment casters voted almost unanimously for an increase in tonnage for 1980. 100% of respondents in the aluminum, titanium, low-carbon steel, low-alloy steel and high-alloy steel categories expect an increase. 100% of the respondents indicated that magnesium, though not listed under "Casting Production" because of insufficient data, would be up next year.

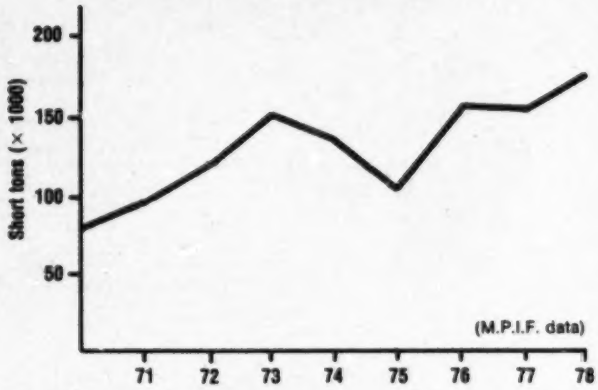
THE POWDER METAL INDUSTRY

CUSTOM OR CAPTIVE? ACCORDING TO OUR SURVEY, THE POWDER METAL INDUSTRY IN 1979 is . . .

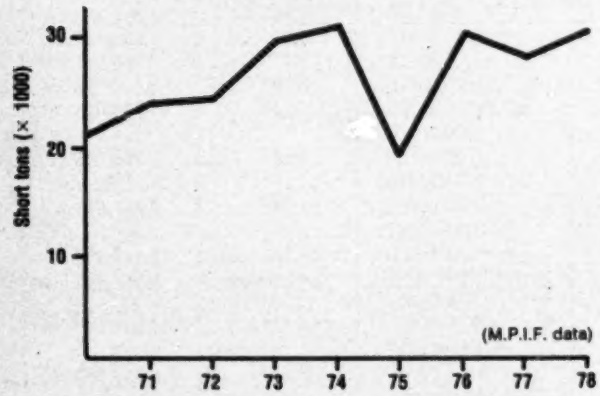
The average P/M plant employs 55 people and, according to our survey, used 32.6 die sets in 1978. 68% of dies used in the P/M industry are made in outside shops, but 89% of the P/M producers surveyed perform secondary machining on parts. 78% offer coining/sizing operations.

TRENDS IN IRON POWDER (P/M PARTS ONLY)

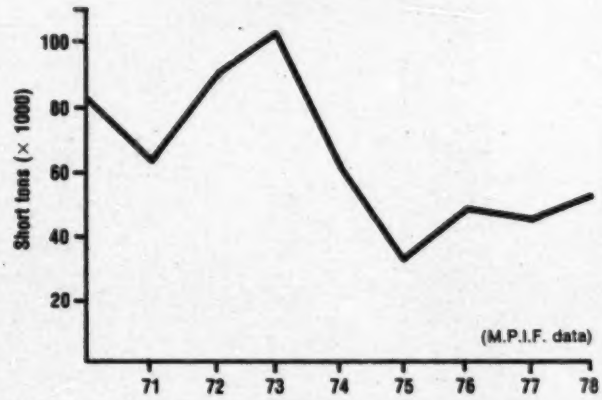
Includes iron-base alloys but not stainless alloys.



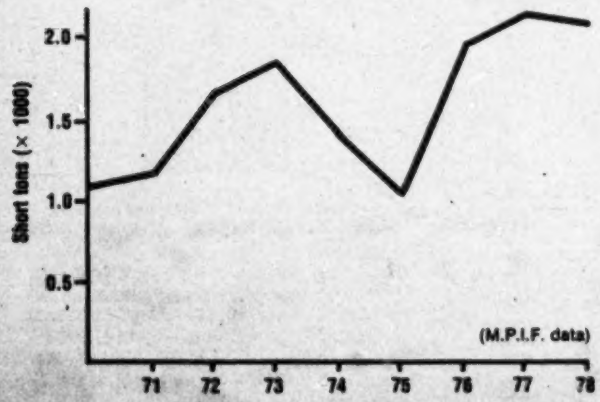
TRENDS IN Cu AND Cu-BASE POWDERS (GRANULAR)



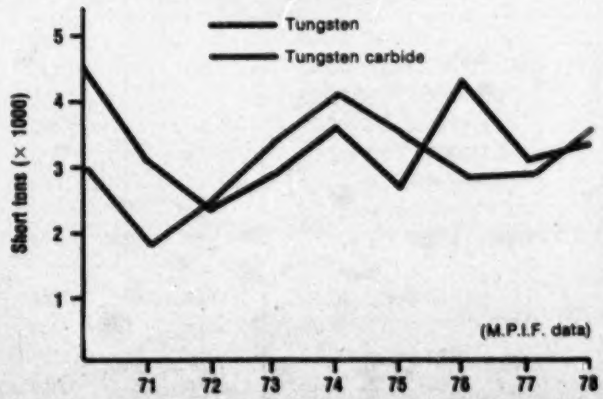
TRENDS IN ALUMINUM POWDER (ATOMIZED GRANULAR)



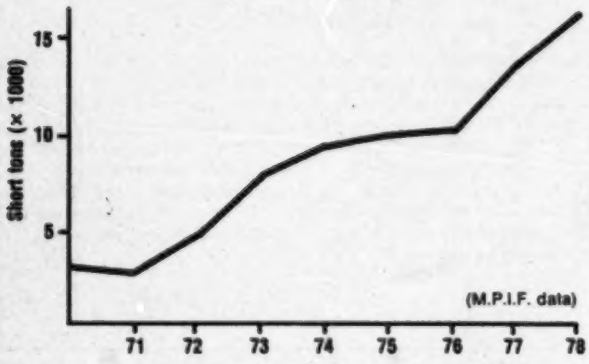
TRENDS IN MOLYBDENUM POWDER



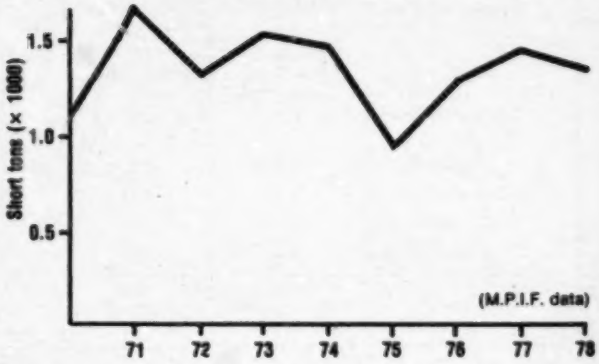
TRENDS IN TUNGSTEN & TUNGSTEN CARBIDE POWDERS



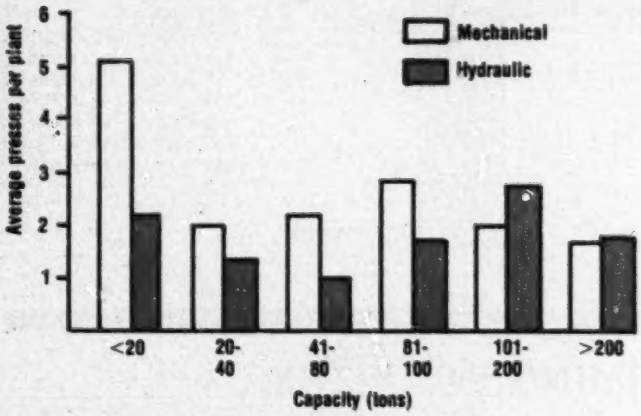
TRENDS IN NICKEL POWDER



TRENDS IN TIN POWDER

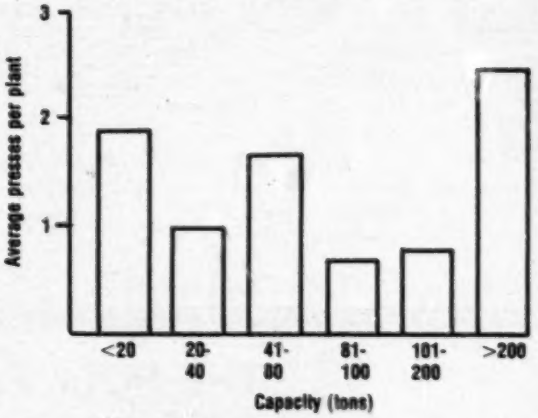


P/M COMPACTING PRESS DISTRIBUTION



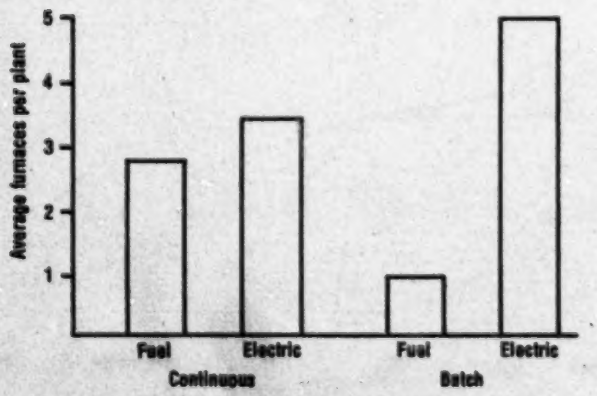
Based on projected data, there are currently 2,400 mechanical and 890 hydraulic compacting presses installed in the P/M industry. Plans to buy indicate the industry will buy approximately 200 new mechanical and 110 hydraulic presses in 1980.

P/M COINING PRESS DISTRIBUTION



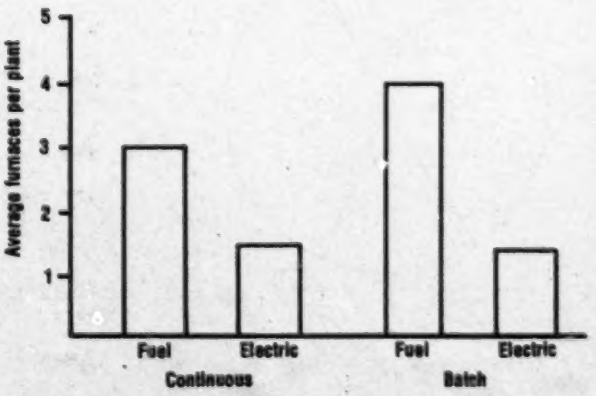
Based on projected data, there are currently 680 coining presses installed in the P/M industry. Plans to buy indicate an additional 88 units in 1980.

P/M SINTERING FURNACE DISTRIBUTION



Based on projected data, there are currently 1680 sintering furnaces of all types in the P/M industry. Plans to buy indicate approximately 250 furnaces will be installed next year, with the greatest number in the electric batch category.

P/M HEAT TREATING FURNACE DISTRIBUTION



Based on projected data, there are currently 850 heat treating furnaces of all types in the P/M industry. The only indicated plans to buy new furnaces were for batch-type electric units, and the sample was too small to estimate total additions.

1979 ANNUAL PM INDUSTRIES REPORT

P/M SINTERING ATMOSPHERE GENERATORS

TYPE	INSTALLED PER PLANT	PROJECTED IND. TOTAL
HYDROGEN	1.2	130
DISSOCIATED AMMONIA	1.9	206
ENDOTHERMIC	2.2	238
EXOTHERMIC	3.0	326
NITROGEN	1.2	130
	Total generators 1030	

Plans to buy indicate the P/M industry will add about 130 atmosphere generators in 1980. According to respondents, the largest number of additional atmosphere generators will be nitrogen units. According to our survey, the average P/M plant used 31 million cubic feet of sintering atmosphere last year. Projected total industry consumption of sintering atmospheres is 15 billion cubic feet for 1978.

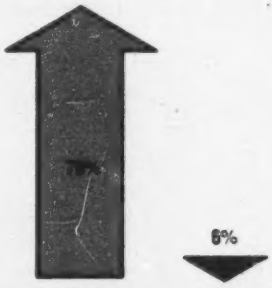
The projected industry total for powder blenders is 564 units. Estimated additional blenders for 1980 indicates the industry will add 73 more blenders. The P/M industry has an estimated 188 pieces of impregnating equipment.

P/M LUBRICANT CONSUMPTION

TYPE	USED PER PLANT (TONS)	PROJECTED IND. TOTAL (TONS)
GRAPHITE*	24.0	7200
LITHIUM STEARATE	2.2	660
ZINC STEARATE	31.6	9300
STEARIC ACID	0.3	insufficient data
WAX	2.1	630

*Tonnage reflects use of graphite for other than lubrication purposes.

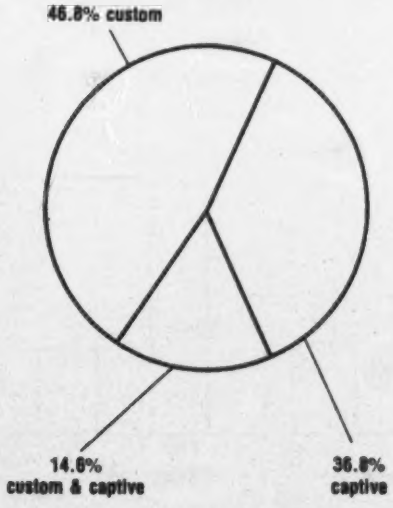
THE P/M INDUSTRY FORECASTS 1980



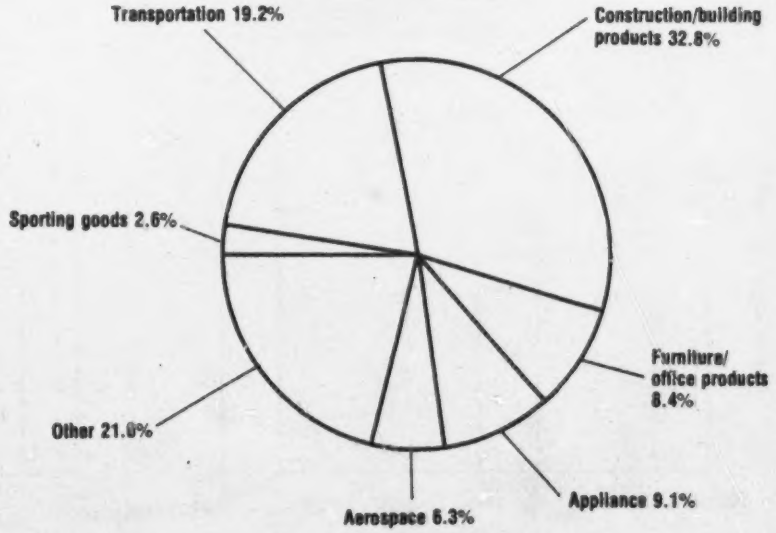
In the opinion of responding P/M producers, 1980 will bring greater part shipments. 79% expect an increase in tonnage next year, 6% expect a decrease and 15% do not believe there will be any substantial change.

THE ROLL FORMING INDUSTRY

CUSTOM OR CAPTIVE? ACCORDING TO OUR SURVEY, THE ROLL FORMING INDUSTRY IN 1979 IS . . .

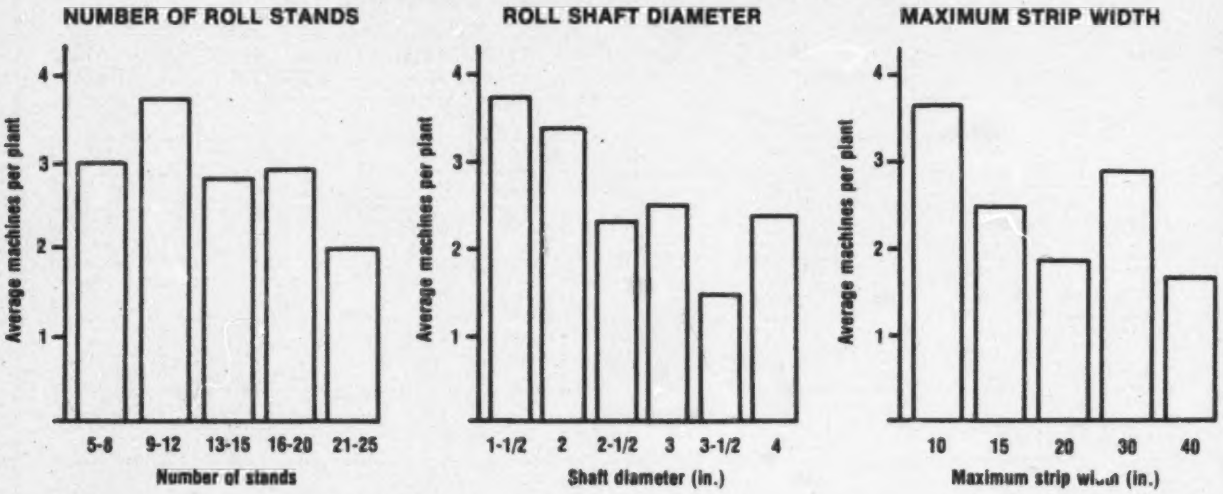


END PRODUCT DISTRIBUTION FOR ROLL FORMED SHAPES IS . . .



The average roll forming plant in our survey employs 40.1 people and has 9.1 roll forming and/or tube mills. Steel purchasing practices among roll formers surveyed indicated that 2.7% buy steel from steel service centers, 86% buy in pre-slit coils from the mill and 11% buy in wide coils to be slit in-plant.

ROLL FORMING MACHINE DISTRIBUTION BY . . .



Based on projected data, there are currently 11,500 roll forming machines in the roll forming industry. Plans to buy indicate as many as 900 new machines will be added in 1980. Projected industry total for tube mills is 700 units, with plans to add 60 tube mills in the coming year. Bar graphs of roll forming machine distribution among plants surveyed show the greatest number of machines have 9-12 stands, 1-1/2 to 2-in. roll shafts and can roll form strip up to 10 to 15 in. wide.

ROLL FORMING AUXILIARY EQUIPMENT SURVEY

TYPE OF EQUIPMENT	RESPONDING PLANTS NOW HAVE	AVERAGE NO./PLANT	PROJECTED IND. TOTAL	ADDITIONS PER PLANT	ESTIMATED IND. ADDITIONS-'80
COIL CANS	512	73.1	3319	—	—
COIL COATERS	8	1.3	11	1.0	1
COIL LIFTERS	145	2.8	926	2.0	73
COIL TIPPERS	23	1.3	152	1.0	20
CUT OFF EQUIPMENT	706	8.0	4662	2.8	306
EDGE FINISHERS	60	1.9	387	1.8	49
EMBOSSING MACHINES	45	2.1	286	1.0	13
FORMING PRESSES	690	10.8	4484	3.8	222
JIB CRANES	298	2.6	1871	1.6	73
LUBRICATING	481	10.5	3381	1.4	45
POWER SHEARS	228	3.1	1488	1.5	78
PRESS BRAKES	340	4.4	2198	1.8	140
PUNCH/NOTCH PRESSES	136	6.4	3170	2.3	104
SCRAP HANDLERS	96	5.4	2136	2.1	84
SLITTERS	68	1.8	444	1.1	57
STACKERS	24	2.7	158	1.7	33
STOCK STRAIGHTENERS	307	5.4	2000	2.2	120
TUBE & SHAPE MILLS	46	3.6	300	2	60
STRIP POLISHERS	19	2.4	125	1.0	7
WELDERS, COIL END	145	3.8	937	2.6	135
WELDERS, SEAM	140	6.7	914	2.7	60
WING FORMERS	26	3.3	171	1.8	34

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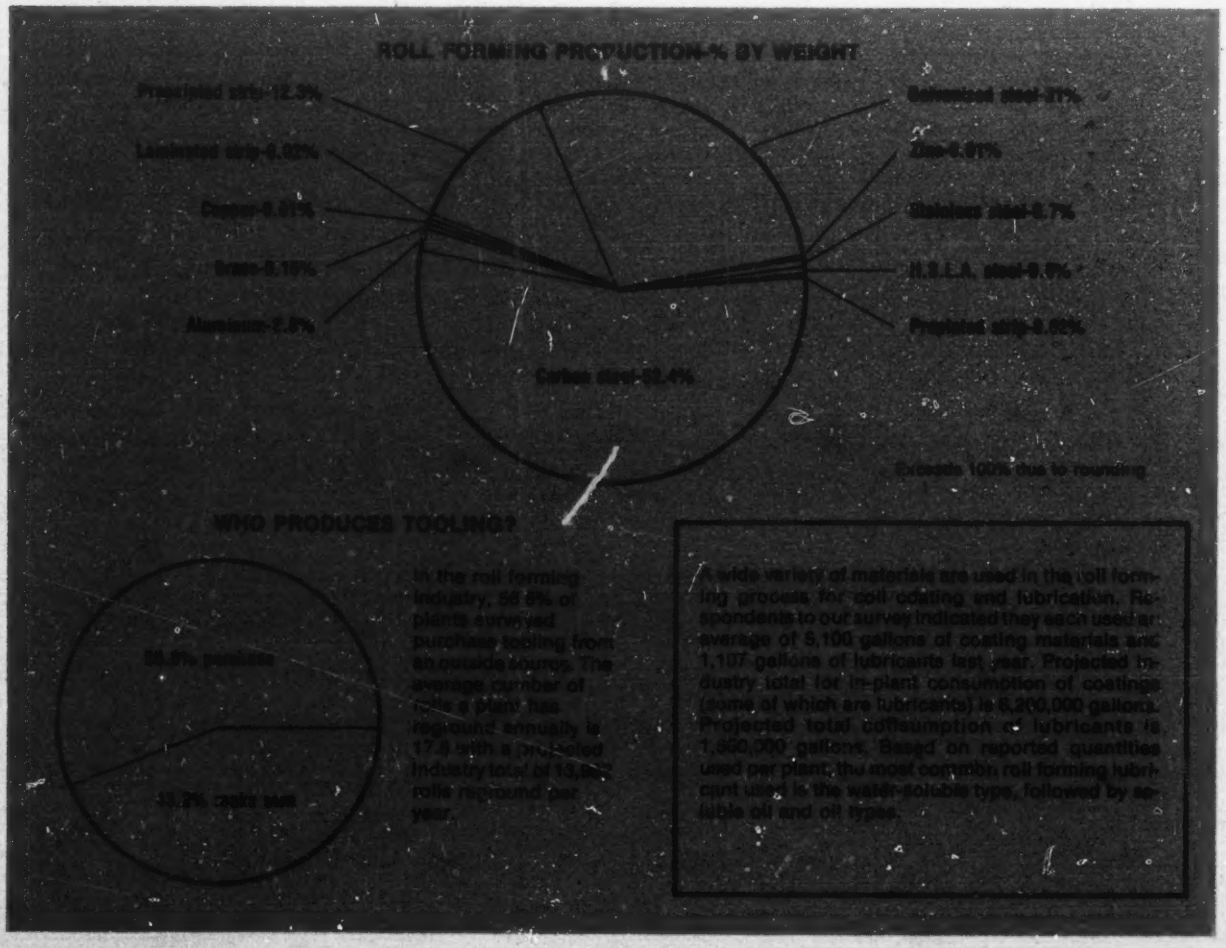
1978 ROLL FORMING PRODUCTION

METAL	RESPONDENTS PRODUCED (TONS)	TONS PER PLANT	PROJECTED IND. TONNAGE	ROLL FORMERS FORECAST 1980	
				% INCREASE	% DECREASE
ALUMINUM	121,140	3106	785,734	76	24
BRASS	6,748	675	43,770	58	42
COPPER	238	34	1,543	73	27
LAMINATED STRIP	821	164	5,322	63	37
PREPAINTED STRIP	518,349	43,196	3,362,268	80	20
PREPLATED STRIP	773	193	5,015	100	—
CARBON STEEL	2,217,827	30,381	14,385,814	71	29
GALVANIZED STEEL	1,310,601	26,747	8,501,207	75	25
H.S.L.A. STEEL	25,439	1,696	165,016	78	22
STAINLESS STEEL	28,047	801	181,917	68	32
ZINC	1,070	268	1,735	40	60

*Note: "Roll formers forecast 1980" shows the percentage of respondents that expect an increase or decrease in tonnage in a given material for 1980.


ROLL FORMING PRODUCTION-% BY WEIGHT
Prepainted strip-12.3%
Laminated strip-0.02%
Copper-0.01%
Brass-0.19%
Aluminum-2.8%
Balanced steel-31%
Zinc-0.01%
Stainless steel-0.7%
H.S.L.A. steel-0.6%
Prepated strip-0.02%
Carbon steel-52.4%
Exceeds 100% due to rounding
WHO PRODUCES TOOLING?
In the roll forming industry, 66.8% of plants surveyed purchase tooling from an outside source. The average number of dies a plant has resharpened annually is 17.9 with a projected industry total of 13,[illegible] rolls resprund per year.
A wide variety of materials are used in the roll forming process for coil coating and lubrication. Respondents to our survey indicated they each used an average of 5,100 gallons of coating materials and 1,107 gallons of lubricants last year. Projected industry total (of in-plant consumption of coatings some of which are lubricants) is 6,200,000 gallons. Projected total consumption of lubricants is 1,600,000 gallons. Based on reported quantities used per plant, the most common roll forming lubricant used is the water-soluble type, followed by soluble oil and oil types.